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A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME

TECHNICAL FIELD

The present invention relates to a warp knit having excellent touch and a process of preparing such a warp knit.

More particularly, the present invention relates to a warp knit with softness and draping property due to its very fine structure and thus useful for materials of artificial leathers or ladies' clothes, and a process of preparing such a warp knit.

BACKGROUND ART

If a fiber becomes fined, its bending strength becomes weakened. Accordingly, since fabrics produced with ultra fine fiber have very soft touch, researches in connection with producing such ultra fine fiber on a commercial scale are developing very actively. Also, development of the technology which is capable of producing synthetic yarn extremely finely leads to great improvement of the value of the goods of sensitive materials for clothes.

Generally, a process of preparing ultra fine fiber is divided into

three processes: a direct spinning process; a two components division type spinning process; and a two components extraction type spinning process. In the direct spinning process, it is possible to prepare ultra fine fiber of 0.3~0.5 denier. In the two components division type spinning process, it is possible to prepare ultra fine fiber of 0.2 denier. In the two components extraction type spinning process, it is possible to prepare ultra fine fiber of 0.01 denier or below.

In case that the ultra fine fiber prepared by means of the direct spinning process is applied to a warp knit, warping property and appearance of the warp knit is very poor since numerous filaments are scattered. Furthermore, the warp knit thus prepared is very inferior in touch and writing effect.

In case that the ultra fine fiber prepared by means of the two components division type composite spinning process consisting of nylon/polyester is applied to a warp knit, warping property and knitting property of the warp knit is very poor since the nylon is isolated from the polyester by means of the tension and friction in warping and knitting. Furthermore, appearance of the prepared product is very poor due to limit of the denier of the ultra fine fiber.

In case that the composite fiber of 0.05 denier or below prepared by

means of the two components extraction type spinning process is applied to a warp knit, warping property, knitting property and touch of the warp knit are good; however, density in the structure of the warp knit is loosened and thus appearance of the warp knit is poor since the extraction component is extracted at the following processing step for producing in ultra fine fiber. Furthermore, the warp knit prepared by means of the afore-said process is inferior in shape stability and flexibility thereof.

Producing goods with ultra fine fiber are developing in variety in connection with textile applications. However, producing goods with ultra fine fiber are not developing connection with knitting applications since the poor warping property and the several drawbacks generated at the following processing step as mentioned above.

Accordingly, it is an object of the present invention to prepare a warp knit, which has excellent touch, shape stability, flexibility, and appearance, and thus is suitable for materials of ladies' clothes, with good warping property and knitting property.

DISCLOSURE OF THE INVENTION

The present invention provides a warp knit which has excellent touch, shape stability, flexibility, and appearance, and thus is suitable for

materials of ladies' clothes. The present invention also provides a process of preparing such a warp knit with good warping property and knitting property.

More particularly, the present invention relates to a warp knit comprising three layers, namely a front surface layer, a rear surface layer, and an intermediate layer arranged between the front surface layer and the rear surface layer, the front surface layer consisting of ultra fine yarn with mono-filament denier of 0.01~0.3 denier, the intermediate layer consisting of spandex elastic yarn, the rear surface layer consisting of synthetic yarn or high shrinkage yarn with mono-filament denier of 1~5 denier, wherein the recovery rate of elongation in the directions of wale and course is 25~60 %.

The present invention also relates to a process of preparing a warp knit having excellent touch, characterized in that firstly, knitting a warp knit by using a composite fiber consisting of a fiber formation component of 0.01~0.3denier and a extraction component as a yarn of a front surface layer, a spandex elastic yarn as a yarn an intermediate layer, and a polyester yarn or high shrinkage yarn with mono-filament of 1~5denier as a yarn of a rear surface layer, and then raising the warp knit until the shrinkage rate of the warp knit is reached 40% or more, and then

preliminarily heating, extracting the extraction component from the composite yarn, dyeing, buffing, and finally heating the warp knit continuously.

The present invention will now be described in more detail.

The inventor of the present application accomplished the present invention, taking notice of the fact that the selection and the combination of the materials in designing structure is very important in order to prepare polyester warp knit which is as soft as natural suede and which has excellent appearance as well as excellent warping property and knitting property.

Fist of all, the present invention uses a composite fiber consisting of fiber formation components of 0.01~0.3 denier and extraction component as a yarn of the front surface layer. If the extraction component is removed from the composite fiber, the fiber formation component with mono-filament denier of 0.01~0.3 denier is only remained. If the mono-filament denier of the yarn at the front surface layer is more than 0.3 denier, its soft touch is poor and the writing effect is not revealed. If the mono-filament denier of the yarn at the front surface layer is less than 0.01 denier, its soft touch is maintained, but its appearance is poor since the raised fiber are omitted or entangled due to friction.

It is preferable that polyester is used as the fiber formation component and copolyester with excellent alkali hydrolysis property is used as the extraction component of the composite fiber used as yarn of the front surface layer. The content of the extraction component in the composite fiber is generally 20~40 % in weight.

It is preferable that the density of the yarn at the front surface layer is increased in order to improve the touch of the warp knit. It is possible for increasing the density of the yarn at the front surface layer to reduce the content of extraction component in the composite fiber during the manufacturing stage ; however, it is curbed technically in spinning process, and there are limitations in increasing the density thereof even if the content of the extraction component in the composite fiber is reduced.

Accordingly, the present invention is characterized in that spandex elastic yarn are used as yarn of the intermediate layer, whereby the yarn density of the front surface layer is increased by virtue of the shrinkage of the intermediate layer. The spandex elastic yarn, which is yarn of the intermediate layer, is of excellent shrinking property, therefore it increases the yarn density of the front surface layer on the finished warp knit, and provides good touch, flexibility and repulsiveness to the warp knit. The total denier of the spandex elastic yarn is preferably between 30 and

90 denier.

Next, synthetic yarn with mono-filament denier of 1~5 denier, more preferably of polyester yarn or high shrinkage yarn, are used as the yarn of the rear surface layer. If the mono-filament denier of the yarn at the rear surface layer is less than 1 denier, draping property of the warp knit is decreased. If the mono-filament denier of the yarn at the rear surface layer is more than 5 denier, warping property and knitting property of the warp knit are deteriorated. If the regular polyester yarn is used as the yarn of the rear surface layer, mechanical stability and shape stability of the warp knit is improved. Concretely, of 50 denier/24 filament of polyester yarn is used as the yarn of the rear surface layer. The high shrinkage yarn has high shrinkage rate of boiling water, whereby it is prevented that ultra fine yarn are come out of the rear surface layer.

The high shrinkage yarn, which are used as the yarn of the rear surface layer, preferably have the shrinkage rate of boiling water of 15~50 % and the stress of the heat shrinkage of 0.2 g/d or more. If the shrinkage rate of boiling water is less than 15 %, it is not possible to increase the density of ultra fine yarn, which are the yarn of the front surface layer, and thus the touch is poor since the shrinkage is extremely low. If the shrinkage rate of boiling water is more than 50 %, it is possible

to increase the density of ultra fine yarn, which are the yarn of the front surface layer; however, it is hard to control the process width of the finished warp knit since the shrinkage is extremely high. Furthermore, if the stress of the heat shrinkage is less than 0.2 g/d, the stress between the structural points is not overcome even if the shrinkage rate of boiling water is high, and therefore sufficient shrinkage is not provided.

Copolyester is preferably used as the high shrinkage yarn as mentioned above. Co-polymer components include bisphenol-A, polyethyleneglycol, isophthalic acid or the like. However, the present invention is not limited to the co-polymer components as described above.

The content of the yarn of the front surface layer when it is knitted is preferably 40~87 % in weight of the total weight of the processed warp knit. If the content of the yarn of the front surface layer is less than 40 % in weight, the touch of the warp knit is poor. If the content of the yarn of the front surface layer is more than 87 % in weight, the draping property and the mechanical property of the warp knit is deteriorated as the content of the yarn of the intermediate layer and the yarn of the rear surface layer are little relatively.

On the other hand, the content of the yarn of the intermediate layer and the yarn of the rear surface layer is preferably 3~20 % in weight and

10~57 % in weight of the total weight of the processed warp knit, respectively. If the content of the yarn of the intermediate layer and the yarn of the rear surface layer is more than the range as mentioned above respectively , the touch of the warp knit is poor; and if the content of the yarn of the intermediate layer and the yarn of the rear surface layer is less than the range as mentioned above respectively, the shape stability and the draping property of the warp knit are deteriorated.

The present invention is characterized in that such a raw warp knit as mentioned above is raised so that the shrinkage rate of the raw warp knit is 40 % or more before preliminary heat treatment of the raw warp knit. After the raw warp knit is raised according to the present invention, it is preliminarily heat-treated as usual, and it is treated in alkali solution, thereby the extraction component is removed from the composite fiber. After that, the warp knit is dyed, buffered and finally heat-treated. It is preferable to maintain the density of the processed warp knit at 40~80 each/inch so that excellent touch and the shape stability is obtained.

The warp knit of the present invention is composed densely out of ultra fine yarn with mono-filament denier of 0.01~0.3 denier, whereby its touch and appearance are very excellent. Especially, as the warp knit of the present invention includes the intermediate layer consisting of spandex

elastic yarn with excellent flexibility, the density of the ultra fine yarn at the front surface layer is higher, and recovery rate of elongation of a warp knit in the directions of the wale and the course is 25~60 %, which represents excellence. Also, as the warp knit of the present invention includes the rear surface layer consisting of the yarn of regular synthetic yarn with mono-filament denier of 1~5 denier, the shape stability and the mechanical property of the warp knit are excellent.

As described in detail above, the warp knit of the present invention has excellent touch, appearance, flexibility, shape stability, and draping property, and thus it is suitable for materials of ladies' clothes or materials of artificial leathers.

The properties of the warp knit according to the present invention are evaluated as follows:

Softness

Softness of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit is soft, it is excellent. If five~seven specialists determine that the warp knit is soft, it is ordinary. If more than eight specialists determine that the warp knit is not soft, it is poor.

Draping property

Draping property of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has draping property, it is excellent. If five~seven specialists determine that the warp knit has draping property, it is ordinary. If more than eight specialists determine that the warp knit has poor draping property, it is poor.

Writing effect

Writing effect of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has writing effect, it is excellent. If five~seven specialists determine that the warp knit has writing effect, it is ordinary. If more than eight specialists determine that the warp knit has poor writing effect, it is poor.

Appearance

Appearance of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has good appearance, it is excellent. If five~seven specialists determine that the warp knit has good appearance, it is ordinary. If more than eight specialists determine that the warp knit has poor appearance, it is poor.

Recovery rate of elongation (%)

Total measurement is carried out according to KSK 08125, but proper elongation length when being elongated at the constant velocity is output by using JIS L 1096. Both ends of a sample of the warp knit with length of 10 cm and width of 15 cm are fixed to Instron. The warp knit is elongated constantly at the stretching velocity of 100 mm/min until the load of 750 g is reached. The warp knit is left as it is with the load being removed. Next, the warp knit is elongated at the constant velocity up to the original position. And then, the warp knit is left as it is for three minutes with the load being removed. The above process is repeatedly carried out five times. Finally, the elongated length L and the free elongated length L_1 are measured. The free elongated length L_1 is obtained by subtraction of the length measured after the warp knit is left as it is from the elongated length L (See Fig. 1). The recovery rate of elongation is obtained by putting the elongated length (L) and the free elongated length (L_1) in the following equation:

recovery rate of elongation (%) = [elongated length (L) - free elongated length (L_1)]/elongated length (L) × 100

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a graph showing recovery rate of elongation of a warp knit measured using an Instron in accordance with the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The present invention is now understood more concretely by comparison between examples of the present invention and comparative examples. However, the present invention is not limited to such examples.

Example 1

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using spandex elastic yarn of 40 denier/ 5 filamnet as a yarn of the intermediate layer, and then using polyester yarn with mono filament of 5 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of

the front surface layer : the yarn of the intermediate layer : the yarn of the rear surface layer is 55 % in weight : 10 % in weight : 35 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Example 2

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.07 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using spandex elastic yarn of 40 denier/ 5 filamnet as a yarn of the intermediate

layer, and then using polyester yarn with mono filament of 3 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the intermediate layer : the yarn of the rear surface layer is 60 % in weight : 5 % in weight : 35 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 55%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 55 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Example 3

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the

extraction component, as a yarn of the front surface layer, and then using spandex elastic yarn of 40 denier/ 5 filamnet as a yarn of the intermediate layer, and then using copolyester yarn with mono filament of 5 denier and shrinkage rate of boiling water of 28%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the intermediate layer : the yarn of the rear surface layer is 55 % in weight : 10 % in weight : 35 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Example 4

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is

polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.07 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using spandex elastic yarn of 40 denier/ 5 filamnet as a yarn of the intermediate layer, and then using copolyester yarn of with mono filament 3 denier and shrinkage rate of boiling water of 20%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the intermediate layer : the yarn of the rear surface layer is 60 % in weight : 5 % in weight : 35 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 55%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 55 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative example 1

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 0.5 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the rear surface layer is 55 % in weight : 45 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative example 2

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.4 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 0.5 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the rear surface layer is 60 % in weight : 40 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 20%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative example 3

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 10 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the rear surface layer is 55 % in weight : 45 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 55%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative example 4

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 0.5 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the rear surface layer is 55 % in weight : 45 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative example 5

At first, prepare the raw warp knit by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 10 denier as a yarn of the rear surface layer. At this time, ratio in weight of the yarn of the front surface layer : the yarn of the rear surface layer is 55 % in weight : 45 % in weight. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 55%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit having the density of 60 each/inch by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Table 1: Results of property evaluation of warp knit

Class	softness	Draping property	Witting effect	appearance	Recovery rate of elongation(%)	
					In the direction of wale	In the direction of course
Example 1	Excellent	Excellent	Excellent	Excellent	41.9	37.6
Example 2	Excellent	Excellent	Excellent	Excellent	35.7	32.8
Example 3	Excellent	Excellent	Excellent	Excellent	42.2	38.7
Example 4	Excellent	Excellent	Excellent	Excellent	36.1	33.5
Comparative example 1	Ordinary	Poor	Excellent	Ordinary	20.0	18.6
Comparative example 2	Poor	Excellent	Poor	Ordinary	15.9	17.2
Comparative example 3	Poor	Excellent	Excellent	Ordinary	10.4	13.0
Comparative example 4	Ordinary	Poor	Excellent	Ordinary	20.2	18.6
Comparative example 5	Poor	Excellent	Excellent	Ordinary	10.4	13.0

INDUSTRIAL APPLICABILITY

As described above, the warp knit according to the present invention has excellent touch, appearance, elastic recovery rate, draping property, and thus is useful for materials of artificial leathers or ladies' clothes. Furthermore, the process of preparing such a warp knit according to the present invention has very excellent warping property and knitting property.